CONSTRUCTION MASTER
HEAVYCALC™

For Today's Excavation Professional

CALCULATED INDUSTRIES®

BANK	234.5

CU   YD

CONSTRUCTION MASTER®

HEAVYCALC™

| Off | On/C |

Length	Width	Depth	Vol	Weight
Comp	Bank	Loose	Exist	Prop
Cu	Sq	m	mm	Cut/Fill
Yds	Feet	Inch	/	Cnst

Conv	7	8	9	÷
Rcl	4	5	6	×
M+	1	2	3	+
%	0	•	=	−

M–R/C

Tape
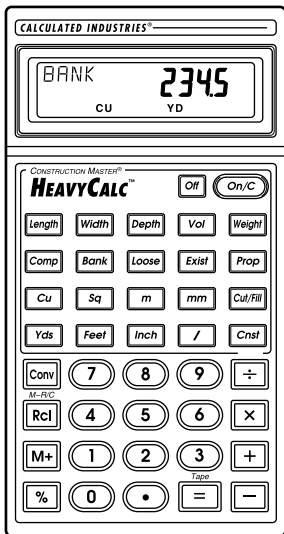
USER'S GUIDE

CALCULATED INDUSTRIES®

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INTRODUCING HEAVYCALC™

Designed for today's excavation and heavy construction professional, the *Construction Master HeavyCalc™* adds even more power to the *Construction Master* line-up. As with earlier models, this calculator is so simple to use, even the novice will find it easy to solve hundreds of dimension-related problems right in feet, inches, fractions and cubic yards!

◆ Solve Dimensional Math with Ease

◆ Instant Dimensional Conversions

◆ English/Metric Conversions

◆ Weight/Volume Conversions

◆ Calculate Square & Rectangular Areas

◆ Determine Cubic Volumes

◆ Determine % Grade and Slope

◆ Determine Cut and Fill

◆ Find Bank, Loose & Compact Volumes

◆ Instant Square-Up (Diagonal) Solutions

◆ Constant Add feature

◆ Average Calculations

◆ Material Estimations

◆ Paperless Tape Register

KEY DEFINITIONS

Basic Functions

[+] [–] [x] [÷] [=]
Math Operators — Used to calculate math problems.

[%]
Percent — Four-function percent key.

0 – 9 and [•]
Numerical Digits and Decimal Point Used for keying in numbers.

[Off]
Power Off — Turns all power off. Resets the display and all non-permanent registers.

[On/C]
On/Clear — Turns on power. One press clears the last entry and display. Two presses clear all temporary registers.

[Conv]
Convert — Used with dimensional keys to convert among dimensions. Dimensions can only be converted within the same convention (i.e., linear, square or cubic). Also used to access special functions when used in combination with other keys.

[Cnst]
Constant – This key is used to store a value permanently for use as a constant in repeated calculations.

[Conv] [Cnst]
Square Root — Used to find the square root of a non-dimensional or area value.

[M+]
Memory Add — Adds the displayed value to the Memory total in the summation register. The Memory total is recalled by pressing [Rcl] [M+].

[Conv] [M+]
Memory Subtract — Subtracts the displayed value from Memory.

[Rcl]
Recall — Recalls values stored in any register (i.e., press [Rcl] and then the key you wish to display the value of).

[Rcl] [Rcl]
Memory Recall and Clear — Displays and clears the value in memory.

[Conv] [Rcl]
Memory Clear — Clears Memory without changing the display.

Dimension Keys

[Yds]
Yards — This is an entry and conversion key (when used with [Conv]). The entry can be a whole number or a decimal number.

[Feet]
This is an entry and conversion key (when used with [Conv]). The entry can be in whole or decimal numbers. This key can also be used in conjunction with the [Inch] and [/] keys for entering values in Feet-Inch format. For example, *6 feet 9-1/2 inches* is entered as follows: 6 [Feet] 9 [Inch] 1 [/] 2. Repeated presses of this key during conversions will toggle between Feet-Inch and Decimal Feet formats.

[Inch]
This is an entry and conversion key. The entry can be in whole or decimal numbers. This key can also be used with the [/] key for entering values in Fractional Inch format. For example, enter 9-1/2 inches as: 9 [Inch] 1 [/] 2. Repeated presses of [Inch] during conversions, toggles between Fractional Inch and Decimal Inch formats.

[/]
Fraction Bar — This key is used to enter fractions. Fractions can be entered as proper (1 or less – 1/2, 1/8, 1/16) or improper (greater than 1 – 3/2, 65/64). For example, to enter *1/2*, the key sequence would be: 1 [/] 2. If the denominator (the bottom number) is not entered, then the set fractional level (1/16, 1/2, etc.) is used. [Rcl] [/] displays the current fractional setting.

[Rcl] [x]
Imperial/Metric Mode — Selects either Imperial or Metric defaults for the following settings: pitch, stair riser height, and on-center spacing.

[Cu]
Cubic — This key is used with a dimension key (feet, inches, yards, meters, or millimeters) to identify a volume value. Example: 5 [Cu] [Yds].

[Sq]
Square — This key is used with a dimension key (feet, inches, yards, meters, or millimeters) to identify an area value. Example: 10 [Sq] [Feet].

[m]

Meters — This is an entry and conversion key used to enter decimal meters or, when used with [Conv], to convert to decimal meters from some other dimensional format.

[mm]

Millimeters — This is an entry and conversion key used to enter decimal millimeters or, when used with [Conv], to convert to decimal millimeters from another dimensional format.

[Weight]

This key is used to convert a dimensioned cubic value or volume to a weight value using the [Conv] key and the stored Weight per Volume (see below). For example, 5 [Cu] [Yds] [Conv] [Weight] equals 7.5 tons, or 10 [Weight] (tons) [Conv] [Cu] [Yds] equals 6.666667 cubic yards. Repeated presses of this key, after a cubic entry or conversion, toggles among tons, pounds and kilograms.

[Conv] [%]

Weight per Volume — Used to set the Weight per Volume. Can be programmed as Tons per Cubic Yard, Pounds per Cubic Yard, or Kilograms per Cubic Meter. Default is 1.5 Tons per Cubic Yard. To set a different weight per volume, for example, 2

Tons per Cubic Yard, press 2 [Conv] [%]. Value will be permanently stored. To recall stored value, press [Rcl] [%].

Area/Volume & Angle Keys

[Length]
Enters the value for length in dimension problems (e.g., for calculating area or volume).

[Conv] [Length]
Square-up — Computes the diagonal, or "square-up," based on entered length and width.

[Width]
Enters the value for width in dimension problems (e.g., for calculating area or volume). Also computes width from entered values of depth and percent grade or slope.

[Conv] [Width]
Percent Grade — Used to enter and display percent grade. Also computes percent grade using entered values for width and depth, or slope.

[Depth]
Enters the value for depth in dimension problems (e.g., for calculating volume). Also computes depth from entered values of width and percent grade or slope.

[Conv] [Depth]
Slope — Used to enter slope as a ratio of run per unit rise (e.g., 4:1), or in decimal degrees (e.g., 10°). Also computes slope using entered value for width and depth, or percent grade.

Note: Only works with width. Does not operate in conjunction with length.

[Vol]
Volume — Computes the volume (in cubic yards) based on entered length, width and depth values. A second press will display the area (in square feet) based on entered length and width. Successive presses will toggle the display between the calculated area and volume.

[Conv] [Vol]
Area – Computes the area (in square feet) based on entered length and width.

Excavation/Volume Keys

[Cut/Fill]
Used to enter or calculate the cut or fill amount (based on entries of proposed and existing benchmarks). A fill is displayed as a positive value; a cut as a negative value.

[Exist]
Existing — Used to enter or calculate an existing benchmark, grade or value.

[Prop]
Proposed — Used to enter or calculate a proposed benchmark, grade or value.

[Bank]
Bank Volume — Enters or calculates the volume for bank fill material. Bank fill is material in an untouched, pristine state.

[Comp]
Compacted Volume — Enters or calculates the volume for compacted fill material. Compacted fill is material that has been compacted.

[Conv] [Comp]
% Shrink — Enters or recalls percent shrink factor for converting between bank and compacted fill volumes.

[Loose]
Loose Volume — Enters or calculates the volume for loose fill material. Loose fill is material that has been disturbed (excavated).

[Conv] [Loose]
% Swell — Enters or recalls the percent swell factor used for converting between bank and loose volumes.

Additional Key Functions

[Conv] [÷]
Reciprocal — 1/x function.

[Conv] [x]
All Clear — Clears all values including Memory. Resets all permanent registers to default settings (weight per volume and fraction set).

[Conv] [+]
Pi ( ) — Constant = 3.141593.

[Conv] [–]
+/– Toggles the sign of the displayed value between positive and negative.

[Rcl] [=]
Tape — Accesses the paperless tape mode.

[Conv] [•]
Per — Allows you to compute a total material cost given a unit dimension and an entered "Per Unit Cost".

[Conv] [0]
Degrees — Used for entering slopes that are in decimal degrees instead of a ratio.

Fractional Rounding Settings

[Conv] 1
Fraction set to 1/16

[Conv] 2
Fraction set to 1/2

[Conv] 3
Fraction set to 1/32

[Conv] 4
Fraction set to 1/4

[Conv] 6
Fraction set to 1/64

[Conv] 8
Fraction set to 1/8

[Conv] 7
Fraction set to "Normal Mode" (reduces to the lowest common denominator).

[Conv] 9
Fraction set to "Fixed Mode" (denominator value always fixed or remains the same as fractional setting).

[Conv] [/]
Toggles the flashing fraction feature on/off. The flashing denominator reflects the current fractional setting.

USING THE HEAVYCALC

Linear Dimensions

To enter dimensional values, enter the largest dimension first – feet before inches, inches before fractions. Enter fractions by entering the numerator (value above the line), pressing **[/]** and then the denominator (value below the line).

Note: If no denominator is entered, the default fraction setting is used. The examples below show how to enter linear dimensions:

Dimension	Keystrokes
5 Feet	5 [Feet]
1/2 Inch	1 [/] 2
5 Feet 1 Inch	5 [Feet] 1 [Inch]
5 Feet 1-1/2 Inch	5 [Feet] 1 [Inch] 1 [/] 2
10 Yards	10 [Yds]
17.5 Meters	17.5 [m]

Note: Yards, meters and millimeters may only be entered as whole values (5 yards) or decimal values (5.5 meters), and not in combination with feet and inches or themselves (5 meters, 8 millimeters). If a problem contains such a dimension, convert the yards (or meters) to "feet-inches" then add dimensions.

Square and Cubic Dimensions

Square and cubic dimensions are entered in the following order:

1) Numerical Value
2) Convention – Square or Cubic
3) Unit – Meters, Yards, Feet,   Inches

Note: Feet–Inch format cannot be used to directly enter square or cubic values. By definition, this display format is a linear measurement. However, the area or vol-ume can be found through simple multipli-cation.

The following examples show how to enter square and cubic dimensions:

Dimensions	Keystroke
5 Cubic Yards	5 [Cu] [Yds]
130 Square Feet	130 [Sq] [Feet]
33 Square Meters	33 [Sq] [m]

Dimension Conversions

Note: Before doing the following exercis - es, make sure the calculator is set to facto - ry defaults. To do this, press [Conv] [x].

ALL SAMPLE EXERCISES IN THIS MANUAL ARE BASED ON DEFAULT VALUES UNLESS OTHERWISE STATED.

Linear Conversions

Convert 14 feet to other linear dimen-sions:

Keystrokes	Display
[On/C] [On/C]	0.
14 [Feet] . . .	
[Conv] [Yds]	4.666667 YD
[Conv] [Feet]	14 FT 0 IN
[Conv] [Inch]	168 IN
[Conv] [mm]	4267.2 MM
[Conv] [m]	4.2672 M

Note: In the last conversion to "mm" the answer displays as "meters." This will occur whenever the answer is beyond the calculator's normal 7-digit range.

Square Conversions

Convert 14 square feet to other square dimensions:

Note: When converting values, [Conv] only has to be pressed once.

Keystrokes	Display
[On/C] [On/C]	**0.**
14 [Sq] [Feet] . . .	
[Conv] [Inch]	**2016 SQ IN**
[Yds]	**1.555556 SQ YD**
[m]	**1.300643 SQ M**

Cubic Conversions

Convert 14 cubic feet to other cubic dimensions:

Keystrokes	Display
[On/C] [On/C]	**0.**
14 [Cu] [Feet] . . .	
[Conv] [Inch]	**24192 CU IN**
[Yds]	**0.518519 CU YD**
[m]	**0.396436 CU M**

Weight Conversions

Convert 25 tons to other weights:

Keystrokes	Display
[On/C] [On/C]	0.
25 [Weight] . . .	25 TON
[Conv] [Weight]	50000 LB
[Weight]	22679.62 kG
[Weight]	25 TON

Weight per Volume Conversions

Your calculator has the capability of converting between weight and volume. The weight/volume ratio is permanently stored by entering the value and pressing **[Conv] [%]**. The default value is 1.5 tons per cubic yard.

Find the weight of 15 cubic yards at 1.75 tons per cubic yard, then convert to other weights:

Keystrokes	Display
[On/C] [On/C]	0.
1.75 [Conv] [%]	1.75 Ton Per CU YD
15 [Cu] [Yds] . . .	15 CU YD
[Conv] [Weight]	26.25 TON
[Weight]	52500 LB
[Weight]	23813.61 kG
[Weight]	26.25 TON

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Math Operations

Your calculator uses standard chaining logic. This means that you enter your first value, the operator (+, −, x, ÷), the second value, then the (=) sign.

3	[+]	2	[=]	**5**
3	[−]	2	[=]	**1**
3	[x]	2	[=]	**6**
3	[÷]	2	[=]	**1.5**

This feature also makes it easier to solve dimensional problems.

Adding Dimensions

Add 7 feet 3-1/2 inches to 11 feet 4 inches:
7 [Feet] 3 [Inch] 1[/] 2 [+]

11 [Feet] 4 [Inch] [=]   **18 FT 7-1/2 IN**

Add 11 inches to 2 feet 1 inch:
11 [Inch] [+] 2 [Feet] 1 [Inch] [=] **36 IN**

Add 2 feet 1 inch to 11 inches:
2 [Feet] 1 [Inch] [+]

11 [Inch] [=]   **3 FT 0 IN**

Note: *The format of the first value you enter determines the format of the answer. However, with the [Conv] key you can change to any format you want, provided that you maintain convention.*

Subtracting Dimensions

Subtract 3 feet from 11 feet 7-1/2 inches:
11 [Feet] 7 [Inch] 1 [/] 2
[–] 3 [Feet] =]   **8 FT 7-1/2 IN**

Subtract 32 inches from 81 inches:
81 [Inch] [–] 32 [Inch] [=]   **49 IN**

Multiplying Dimensions

Multiply 5 feet 3 inches by 11 feet 6-1/2 inches:
5 [Feet] 3 [Inch] [x]
11 [Feet] 6 [Inch] 1 [/] 2
[=]   **60.59375 SQ FT**

Multiply 2 feet 7 inches by 10 :
2 [Feet] 7 [Inch] [x] 10 [=]   **25 FT 10 IN**

Dividing Dimensions

Divide 30 feet 4 inches by 7 inches:
30 [Feet] 4 [Inch] [÷] 7 [Inch] [=]   **52**

Divide 20 feet 3 inches by 9:
20 [Feet] 3 [Inch] [÷] 9 [=]   **2 FT 3 IN**

Percentage Calculations

The Percent [%] key is used to find a percent of a number or for working add-on, discount or division percentages. It can be used with any type of number, any dimension (feet, inch, millimeter, etc) and convention (non-dimensioned, linear, square or cubic).

Find 18% of 500 feet:
500 [Feet] [x] 18 [%]   **90 FT 0 IN**

Add 10% for waste to 137 square feet:
137 [Sq] [Feet] [+] 10 [%]   **150.7 SQ FT**

Take 20% away from 552 feet 6 inches:
552 [Feet] 6 [Inch]
[−] 20 [%]   **442 FT 0 IN**

Divide 350 cubic yards by 80%:
350 [Cu] [Yds] [÷] 80 [%]   **437.5 CU YD**

Memory Operation

Whenever using the Memory Function, the following keys enable you to add, subtract, and recall values stored in memory:

[M+] adds the displayed value to Memory.

[Conv] [M+] subtracts the displayed value from Memory.

[Rcl] [M+] recalls and displays the total value of the Memory.

[Rcl] [Rcl] displays and clears the Memory.

[Conv] [Rcl] clears memory without affecting the display.

The Memory can be used with any format as long as values have the same convention. The following exercise shows you how to use the Memory Function:

How to Use the Memory Function

Keystrokes	Display
1. 355 [M+]	**355. M**
[Rcl] [Rcl]	**355.**
2. 355 [M+]	**355. M**
255 [M+]	**255. M**
745 [Conv] [M+]	**745. M**
[Rcl] [Rcl]	**– 135.**
3. 10 [Feet] 5 [Inch]	
[M+]	**10 FT 5 IN M**
5 [Feet] 3 [Inch]	
1 [/] 16 [M+]	**5 FT 3-1/16 IN M**
[Rcl] [Rcl]	**15 FT 8-1/16 IN**

You can also use [Conv] [Rcl] [M+] to replace any value in Memory with your current displayed value.

4. 355 [M+]	**355. M**
500 [Conv] [Rcl] [M+]	**500. M**
[Rcl] [Rcl]	**500.**

Averaging

The Memory Key (**[M+]**) is also capable of displaying the average and totals as well as the number (count) of values entered. This is achieved by repeated presses of **[M+]** after recalling the stored total value in Memory.

Keystrokes	Display
1 [M+]	1. 🅼
2 [M+]	2. 🅼
3 [M+]	3. 🅼
4 [M+]	4. 🅼
5 [M+]	5. 🅼
[Rcl] [M+]	15. 🅼
[M+]	AVG 3. 🅼
[M+]	CNT 5. 🅼
[Rcl] [Rcl]	15.

Fraction Settings

When your calculator is in a default condition (battery change or full reset), it is set to round fractional values to the nearest 1/16 of an inch. However, you may program your preference for six different accuracy levels and two different modes (Normal and Fixed), all of which remain in permanent memory until revised or reset. The fractional level can be permanently revised by using **[Conv]** in conjunction with the numbers 1, 2, 3, 4, 6, and 8. The keystrokes and settings are as follows:

Keystroke	Setting
[Conv] 1	1/<u>16</u>
[Conv] 2	1/<u>2</u>
[Conv] 3	1/<u>32</u>
[Conv] 4	1/<u>4</u>
[Conv] 6	1/<u>64</u>
[Conv] 8	1/<u>8</u>

Note: Whenever the calculator is set to anything other than 1/16 normal mode (default), a star (★) appears in the bottom left of the display during power up. To dis - play the fraction setting, press [Rcl] [/].

Normal Fractional Mode

The default, *Normal Mode* ([**Conv**] **7**), reduces a fraction to its lowest common denominator (for example, 8/16 reduces to 1/2). If a fraction is entered having a higher fractional accuracy than the current setting, the setting will be temporarily revised to the level of accuracy of the entered value.

Fixed Fractional Mode

In the *Fixed Mode* ([**Conv**] **9**), fractional results are displayed in the set fractional value, not reduced. Entries of higher accuracy values will be rounded to the nearest fraction of the accuracy setting (for example, for a fraction level setting of 1/16, an entry of 5 [/] 32 [=] will result in a display of 3/16).

Flashing Denominator

Your calculator can be set to flash the denominator (bottom) when entering fractions by pressing [**Conv**] [**/**]. In this way, you can see what fractional accuracy level is set. Pressing [**Conv**] [**/**] again will turn the flashing denominator off. This is a permanent setting that will remain until revised or reset.

Paperless Tape Function

The Paperless Tape allows you to review the last 20 entries of a calculation. To access this function press **[Rcl] [=]**.

To review entered values, press **[Rcl] [=]** to access the tape mode and then press the **[+]** or **[–]** keys to scroll forward or backward through the entries.

While in the paperless tape mode, the display will show the entered or calculated value, along with the sequence number of entry (e.g., 01, 02, 03, etc.) and the math operator (+, –, x, ÷, %) in the upper left corner of the display.

If an equals (**[=]**) has been used in the middle of a string and then added to, the letters **SUB** (Subtotal) will display in the upper left. If equals (**[=]**) was the last operation performed, the display will show **TTL** (Total) as the last entry.

To exit the paperless tape mode, press any key besides **[Off]**, **[+]**, or **[–]**. Exiting the tape will display the last entry (or **TTL**), and allow you to either exit completely, or continue using the last tape value for another operation. For example, to store the last value as "Length", press any key besides **[Off]**, **[+]** or **[–]** and then press **[=] [Length].**

Important: To clear the paperless tape press [On/C] twice, or press off.

Previewing Paperless Tape

1. Enter a string of numbers:

4 [Feet] [+]	**4 FT 0 IN**
5 [Feet] [+]	**9 FT 0 IN**
6 [Feet] [+]	**15 FT 0 IN**
7 [Feet] [=]	**22 FT 0 IN**

2. Access the Tape function:

[Rcl] [=]	**TTL = 22 FT 0 IN**

3. Scroll from first value to total:

[+]	**01 4 FT 0 IN**
[+]	**02+ 5 FT 0 IN**
[+]	**03+ 6 FT 0 IN**
[+]	**04+ 7 FT 0 IN**
[+]	**TTL = 22 FT 0 IN**

4. Scroll to last 2 values:

[−]	**04+ 7 FT 0 IN**
[−]	**03+ 6 FT 0 IN**

5. Exit Tape function and add more:

[=]	**TTL = 22 FT 0 IN**

   (press any key besides [Off], [+] or [−].)

[+]	**22 FT 0 IN**
2 [Feet] [=]	**24 FT 0 IN**

Linear Calculations

Spacing Calculation

You have a 78 feet 6 inch length plot which you want to divide into five equal spaces. What is the length of each section?

Steps/Keystrokes	Display
1. Clear calculator	
[On/C] [On/C]	**0.**
2. Enter overall length	
78 [Feet] 6 [Inch]	**78 FT 6 IN**
3. Divide by number of spaces	
[÷] 5 [=]	**15 FT 8-3/8 IN**
4. What is it in decimal feet?	
[Conv] [Feet]	**15.7 FT**
5. What is it in decimal inches?	
[Inch]	**188.4 IN**

Building Perimeter

You are measuring a building perimeter with the following measurements: 32 feet, 25 feet 5-1/2 inches, 19 feet, 5 feet 6-1/2 inches, 13 feet, and 31 feet. What is the total perimeter?

Steps/Keystrokes	Display
1. Clear calculator	
[On/C] [On/C]	**0.**
2. Enter all dimensions:	
32 [Feet] [+]	**32 FT**
25 [Feet]	
5 [Inch] 1 [/] 2 [+]	**57 FT 5-1/2 IN**
19 [Feet] [+]	**76 FT 5-1/2 IN**
5 [Feet] 6 [Inch] 1 [/] 2 [+]	**82 FT 0 N**
13 [Feet] [+]	**95 FT 0 IN**
31 [Feet] [=]	**126 FT 0 IN**

Area Calculations

Area of a Rectangle

What is the area of a plot measuring 112 feet 6 inches by 151 feet 8 inches?

Steps/Keystrokes	Display
1. Clear calculator	
[On/C] [On/C]	**0.**
2. Enter length	
112 [Feet] 6 [Inch]	
[Length]	**12 FT 6 IN**
3. Enter width	
151 [Feet] 8 [Inch]	
[Width]	**151 FT 8 IN**
4. Find area	
[Conv] [Vol]	**17062.5 SQ FT**

Volume Calculations

Simple Concrete Volume

You need to calculate the cubic yards of concrete required for pouring a driveway. The measurements are as follows: 36 feet 3 inches by 11 feet 6 inches by 4 inches deep. What's the volume of the driveway? If concrete costs $47 per cubic yard, how much will the concrete cost?

Steps/Keystrokes	Display
1. Clear calculator	
[On/C] [On/C]	**0.**
2.Enter length, width and depth then find volume in cubic yards	
36 [Feet] 3 [Inch] [Length]	
11 [Feet] 6 [Inch] [Width]	
4 [Inch] [Depth]	
[Vol]	**5.146605 CU YD**
3. Multiply by price per cubic yard to find total cost	
[x] 47 [Conv] [•]	**$ 241.89**

Topsoil Volume

You are measuring a building perimeter for calculating topsoil excavation. If the building measurements are 45 feet by 23 feet, and the depth of topsoil to be removed is 8 inches, what is the building area and volume of topsoil to be removed?

Steps/Keystrokes   Display

1. Clear calculator

   [On/C] [On/C]   **0.**
2. Enter length and width of building

   45 [Feet] [Length]

   23 [Feet] [Width]
3. Find building area

   [Conv] [Vol]   **1035 SQ FT**
4. Enter depth to be removed

   8 [Inch] [Depth]
5. Find volume of topsoil

   [Vol]   **25.55556 CU YD**

Complex Concrete Volume

The patio below is 4-1/2 inches deep.
Find the total area (divide the drawing
into three rectangles). Second, find the
total yards of concrete required, and
the total cost of concrete if the price is
$55 a cubic yard?
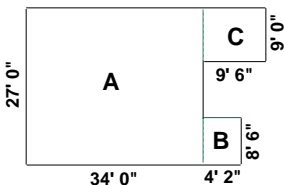
Steps/Keystrokes   Display

1. Clear calculator
   [On/C] [On/C]   **0.**
2. Enter length, width and find area "A"
   34 [Feet] [Length]
   27 [Feet] [Width]
   [Conv] [Vol]   **918 SQ FT**
3. Enter in Memory
   [M+]

4. Enter length, width and find area "B"

   4 [Feet] 2 [Inch] [Length]

   8 [Feet] 6 [Inch] [Width]

   [Conv] [Vol]   **35.41667 SQ FT**

5. Add to Memory

   [M+]

6. Enter length, width and find area "C"

   9 [Feet] [Length]

   9 [Feet] 6 [Inch] [Width]

   [Conv] [Vol]   **85.5 SQ FT**

7. Add to Memory

   [M+]

8. Find total Area/Volume

   [Rcl] [Rcl]   **1038.917 SQ FT**

   [x] 4 [Inch] 1 [/] 2 [=]   **389.5937**
   CU FT

9. Convert to yards

   [Conv] [Yds]   **14.4294 CU YD**

10. Find total cost

    [x] 55 [Conv] [•]   **$ 793.62**

Trench Volume

You're digging a trench that is 6 feet deep, 24 inches wide and 345 feet long. Find the volume of soil removed.

Steps/Keystrokes	Display
1. Clear calculator	
[On/C] [On/C]	**0.**
2. Enter length, width and depth of trench	
345 [Feet] [Length]	
6 [Feet] [Depth]	
24 [Inch] [Width]	
3. Find removed dirt volume	
[Vol]	**153.3333 CU YD**

Right Triangle Problems

The calculator's top row of keys provides built-in solutions to square-up, drop, percent grade and slope problems.

Square-up is computed from the values entered as length and width and is the diagonal length in a right triangle.

Slope and percent grade are computed using the values for width and depth (or drop). Slope can be entered as either a ratio of run per unit rise, or as a decimal degree. Percent grade is entered as a percentage value. The following diagram shows the relationship of these features.
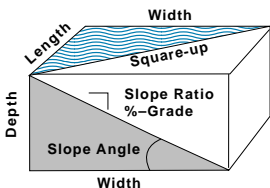

Slope Ratio = Width:Unit Depth

$$\text{Percent Grade} = \frac{\text{Depth}}{\text{Width}} \times 100\,\%$$

Squaring a Concrete Slab

Assume you want to square-up the forms for a concrete foundation measuring 45 feet 6 inches by 24 feet 4 inches. In order for the forms to be square, find the square-up (diagonal) length. If the slab is 4 inches thick, what are the area and volume of the slab?

24' 4"

45' 6"
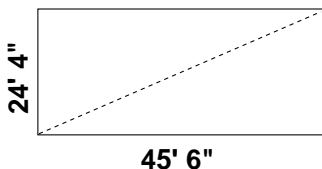
Steps/Keystrokes	Display
1. Clear calculator	
[On/C] [On/C]	**0.**
2. Enter length, width and depth	
45 [Feet] 6 [Inch] [Length]	
24 [Feet] 4 [Inch] [Width]	
4 [Inch] [Depth]	
3. Solve for square-up	
[Conv] [Length]	**51 FT 7-3/16 IN**
4. Solve for area/volume	
[Conv] [Vol]	**1107.167 SQ FT**
[Vol]	**13.66872 CU YD**

Finding Lot Width

What is the width of a lot that has a 5 degree slope and a total drop of 2 feet?

Step/Keystroke	Display
1. Clear calculator	
[On/C] [On/C]	0.
2. Enter slope and drop	
5 [Conv] [0] [Conv] [Depth]	
2 [Feet] [Depth]	
3. Solve for width	
[Width]	22 FT 10-5/16 IN

Note: Slope and % Grade work with Width and Depth, not Length.

Finding Drop or Fall

What is the total drop over 25 feet for a 4:1 slope? For a 5 degree slope? For a 5% grade?

Steps/Keystrokes	Display
1. Clear calculator	
[On/C] [On/C]	**0.**
Solve Drop using Slope ratio	
2. Enter 4:1 slope and width	
4 [Conv] [Depth]	
25 [Feet] [Width]	
3. Solve for drop	
[Depth]	**6 FT 3 IN**
Solve Drop using Slope degree	
4. Enter 5° slope	
5 [Conv] [0] [Conv] [Depth]	
5. Solve for drop	
[On/C] [Depth]	**2 FT 2-1/4 IN**
Solve Drop using Percent Grade	
6. Enter 5% grade	
5 [Conv] [Width]	
7. Solve for drop	
[On/C] [Depth]	**1 FT 3 IN**

Finding Slope Ratio/Percent Grade

What is the slope ratio and percent grade of a lot that drops 3 feet 6 inches over 20 feet?

Step/Keystroke	Display
1. Clear calculator	
[On/C] [On/C]	**0.**

Solve for degree of Slope

2. Enter drop (as Depth)

    3 [Feet] 6 [Inch] [Depth]

3. Enter distance (Width)

    20 [Feet] [Width]

4. Find degree of slope

    [Conv] [Depth]   **9.926246°**

Solve for Slope ratio

5. Find slope ratio

    [Depth]   **5.714286** (or 5.71 to 1)

Solve for Percent Grade

6. Find percent grade

    [Conv] [Width]   **17.5 %**

Basic Cut/Fill Solutions

Finding Cut or Fill–Exercise 1

Find the cut/fill marks or changes of elevations for a lot with a proposed elevation of 4.0 feet and an existing elevations of 3.0 feet, 4.5 feet and 6.0 feet?

Steps/Keystrokes	Display
1. Clear calculator	
[On/C] [On/C]	**0.**
Solve for 1st Cut/Fill mark	
2. Enter proposed elevation	
4 [Feet] [Prop]	
3. Enter 1st existing elevation	
3 [Feet] [Exist]	
4. Find 1st Cut/Fill	
[Cut/Fill]	**1 FT 0 IN FILL**
Solve for 2nd Cut/Fill mark	
5. Enter 2nd existing elevation	
4.5 [Feet] [Exist]	
6. Find 2nd Cut/Fill	
[Cut/Fill]	**– 0.5 FT CUT**
Solve for 3rd Cut/Fill mark	
7. Enter 3rd existing elevation	
6 [Feet] [Exist]	
8. Find 3rd Cut/Fill	
[Cut/Fill]	**– 2 FT 0 IN CUT**

Finding Cut or Fill – Exercise 2

Find the cut/fill marks for a lot that has a proposed elevation of 15.5 feet, and the following existing elevations: 17.3 feet, 20.7 feet, 25.5 feet and 11.8 feet.

Steps/Keystrokes	Display
1. Clear calculator	
[On/C] [On/C]	**0.**

Solve for 1st Cut/Fill mark

2. Enter proposed elevation

   15.5 [Feet] [Prop]

3. Enter 1st existing elevation

   17.3 [Feet] [Exist]

4. Find 1st Cut/Fill

   [Cut/Fill]   **– 1.8 FT CUT**

Solve for 2nd Cut/Fill mark

5. Enter 2nd existing elevation

   20.7 [Feet] [Exist]

6. Find 2nd Cut/Fill

   [Cut/Fill]   **– 5.2 FT CUT**

Solve for 3rd Cut/Fill mark

7. Enter 3rd existing elevation

   25.5 [Feet] [Exist]

8. Find 3rd Cut/Fill

   [Cut/Fill]   **– 10 FT CUT**

Solve for 4th Cut/Fill mark

9. Enter 4th existing elevation

   11.8 [Feet] [Exist]

10. Find 4th Cut/Fill

   [Cut/Fill]   **3.7 FT FILL**

Cubic Yards of Cut/Fill – Grid Cell Method

The four corner elevations of a Grid cell are 75.4 feet, 77.5 feet, 74.6 feet, and 80.5 feet. If the proposed elevation is 83 feet, and the area of the Grid is 2,000 square feet, what is the volume (in cubic yards) of cut or fill required for this Grid cell?

Steps/Keystrokes   Display

1. Clear calculator

   [On/C] [On/C]   **0.**

Find Average Existing Grid Elevation

2. Enter 1st through 4th elevation (in Memory)

   75.4 [Feet] [M+]
   77.5 [Feet] [M+]
   74.6 [Feet] [M+]
   80.5 [Feet] [M+]

3. Find total
   [Rcl] [M+]   **308 FT**
4. Find average
   [M+]   **77 FT**

Solve for Cut or Fill
5. Enter average as existing elevation
   [=] [Exist]
6. Enter proposed elevation
   83 [Feet] [Prop]
7. Find cut or fill
   [Cut/Fill]   **6 FT FILL**

Solve for Grid Volume
8. Enter grid area and find volume
   [x] 2000 [Sq] [Ft] [=]   **12000 CU FT**
9. Convert to cubic yds
   [Yds]   **444.4444 CU YD**

Shrink & Swell Solutions — Material Volume

The *HeavyCalc* is able to convert among Bank Fill, Compacted Fill and Loose (or trucked) Fill soil cubic yard volumes. Once values for %-Shrink and %-Swell are entered, converting among these volumes is done with the press of a single key. Entered values for Percent Shrink and Percent Swell will remain in Memory until they are revised or reset (**[Conv] [x]**).

Finding Loose Volume

How much dry gravel will be trucked out of a hole to be dug that measures 10 feet long by 35 feet wide by 15 feet deep? (Assume dry gravel has a swell factor of 15%.)

Steps/Keystrokes	Display
1. Clear calculator	
[On/C] [On/C]	**0.**

Solve Bank Fill Volume
2. Enter length, width and depth

    10 [Feet] [Length]

    35 [Feet] [Width]

    15 [Feet] [Depth]

3. Solve for volume

   [Vol]   **194.4444 CU YD**

4. Enter as Bank Volume

   [=] [Bank]

Solve Loose Fill Volume

5. Enter 15% swell factor

   15 [Conv] [Loose]

6. Find Loose Volume

   [Loose]   **223.6111 CU YD**

Finding Trucked Volume/Weight –Both Swell & Shrink Factors

You need to move wet sand from one location to another that requires a 4-inch fully compacted fill under a 125 feet long by 75 feet wide slab. What is the trucked (loose fill) volume? (Assume a Swell Factor of 5% and a Shrink Factor of 10%.) What is the total weight of the sand if it weighs 1.55 tons per cubic yard?

Steps/Keystrokes	Display
1. Clear calculator	
[On/C] [On/C]	**0.**
2. Enter Shrink/Swell Factors	
5 [Conv] [Loose]	
10 [Conv] [Comp]	
3. Enter length, width and depth	
125 [Feet] [Length]	
75 [Feet] [Width]	
4 [Inch] [Depth]	
4. Find compacted fill volume	
[Vol] [=] [Comp]	**115.7407 CU YD**
5. Find loose volume	
[Loose]	**135.0309 CU YD**

6. Enter unit weight

   1.55 [Conv] [%]

7. Recall Bank Volume

   [Bank]   **128.6008 CU YD**

8. Find weight

   [Weight]   **199.3313 TON**

9. Reset calculator

   [Conv] [x]   **0.**

APPENDIX

Accuracy/Display – Your calculator has an eleven digit display. This is made up of seven digits (normal display) and four digits for the fraction. In a standard calculation, each calculation is carried out internally to 10 digits and is rounded to a 7-digit standard display. A 5/4 rounding technique is used to add 1 to the least significant digit in the display if the next non-displayed digit is five or more. If this digit is less than five, no rounding occurs.

"Error" – When you make an incorrect entry, or the answer is beyond the range of the calculator, it will display the word "**Error**." To clear an error condition you must hit the **[On/C]** button twice. At this point you must determine what caused the error and re-key the problem. An "Error" condition will also occur if you enter a mathematical impossibility such as division by zero.

Auto-Range – If an "overflow" is created because of an input and calculation with small units that are out of the standard 7-digit range of the display, the answer will be automatically expressed in the next larger units (instead of showing "Error") – i.e., 10,000,000 millimeters cannot be dis-

played because it is out of the 7-digit display, so 10,000 meters will be displayed instead. This auto-ranging also applies to other dimensional units, such as inches to feet, and feet to yards, etc.

Battery and Auto Shut-off – Your calculator is powered by a single 3-Volt Lithium CR-2032 battery. This should last 800 hours of actual use (1 year plus for most people). Should the display become very dim or erratic, replace the battery.

Warning! Please use caution when dispos - ing of your old batteries. They contain hazardous chemicals.

Your calculator is designed to shut itself off after about 8-12 minutes of non-use.

Note: Values in Memory or shown on the display will be cleared.

Full Reset/All-Clear – Press **[Conv] [x]** to clear all memory registers to their initial default values. A Full Reset/All-Clear, returns the following settings to their default state:

Default Settings

Weight per Vol.	1.5 Tons/Cubic Yard
Fractional Setting	1/16
Fractional Mode	Normal

Warranty Repair Service — USA

Calculated Industries, Inc. ("CII") warrants this product against defects in materials and workmanship for a period of one (1) year from the date of original consumer purchase in the U.S. If a defect exists during the warranty period, CII at its option will either repair (using new or remanufactured parts) or replace (with a new or remanufactured unit) the product at no charge.

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